

### Equation Sheet Exam 4

$$c = 2.9979 \times 10^8 \text{ m/s}$$

$$h = 6.6261 \times 10^{-34} \text{ J s}$$

$$N_A = 6.02214 \times 10^{23} \text{ mol}^{-1}$$

$$R = 8.314 \text{ J/(K mol)}$$

$$1 \text{ eV} = 1.60218 \times 10^{-19} \text{ J}$$

$$K_w = 1.00 \times 10^{-14} \text{ at } 25.0^\circ\text{C}$$

$$14.00 = \text{pH} + \text{pOH at } 25.0^\circ\text{C}$$

$$\mathfrak{F} \text{ (Faraday's constant)} = 96,485 \text{ C mol}^{-1}$$

Electromagnetic Spectrum:
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Violet ~ 400-430 nm
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Blue ~ 431-490 nm
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Green ~ 491-560 nm
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Yellow ~ 561-580 nm
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Orange ~ 581-620 nm
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Red ~ 621-700 nm
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Complementary Colors: red/green,  
blue/orange, yellow/violet

$\text{I}^- < \text{Br}^- < \text{Cl}^-$  (weak field ligands)

$< \text{F}^- < \text{OH}^- < \text{H}_2\text{O}$  (intermediate)

$< \text{NH}_3 < \text{CO} < \text{CN}^-$  (strong field ligands)

$$1 \text{ Coulomb} \cdot \text{Volt} = 1 \text{ Joule}$$

$$1 \text{ Bq} = 1 \text{ nuclei/sec}$$

$$1 \text{ A} = 1 \text{ C/s}$$

$$1 \text{ W} = 1 \text{ J/s}$$

$$\ln = 2.3025851 \log$$

$$1 \text{ J} = 1 \text{ kgm}^2\text{s}^{-2}$$

$$x = \frac{-b \pm (b^2 - 4ac)^{1/2}}{2a}$$

$$ax^2 + bx + c = 0$$

$$E = h\nu = hc/\lambda$$

$$c = \nu\lambda$$

$$\Delta G = \Delta H - T\Delta S$$

$$\Delta G = \Delta G^\circ + RT \ln Q$$

$$\Delta G^\circ = -RT \ln K$$

$$\Delta G = RT \ln Q/K$$

$$\ln (K_2/K_1) = -(\Delta H^\circ/R)(1/T_2 - 1/T_1)$$

$$\text{pH} \approx \text{pK}_a - \log (\text{HA}/\text{A}^-)$$

$$\text{pH} = -\log [\text{H}_3\text{O}^+] \quad \text{pOH} = -\log [\text{OH}^-]$$

$$K_w = K_a K_b \quad \text{pK} = -\log K$$

$$Q = It$$

$$\Delta G^\circ_{\text{cell}} = -(n)(\mathfrak{F}) \Delta E^\circ_{\text{cell}}$$

$$\Delta E^\circ(\text{cell}) = E^\circ(\text{cathode}) - E^\circ(\text{anode})$$

$$\Delta E^\circ = E^\circ(\text{reduction}) - E^\circ(\text{oxidation})$$

$$\Delta E_{\text{cell}} = E^\circ_{\text{cell}} - (RT/n\mathfrak{F})\ln Q$$

$$RT/\mathfrak{F} = 0.025693 \text{ V at } 25.0^\circ\text{C}$$

$$\mathfrak{F}/RT = 38.921 \text{ V}^{-1} \text{ at } 25.0^\circ\text{C}$$

$$\Delta E_{\text{cell}} = E^\circ_{\text{cell}} - [(0.025693 \text{ V})(\ln Q)/n] \text{ at } 25.0^\circ\text{C}$$

$$\Delta E_{\text{cell}} = E^\circ_{\text{cell}} - [(0.0592 \text{ V})(\log Q)/n] \text{ at } 25.0^\circ\text{C}$$

$$\ln K = (n\mathfrak{F}/RT) \Delta E^\circ$$

$$A = A_0 e^{-kt}$$

$$N = N_0 e^{-kt}$$

$$A = kN$$

$$[A] = [A]_0 e^{-kt} \quad t_{1/2} = \ln 2 / k$$

$$1/[A] = 1/[A]_0 + kt \quad t_{1/2} = 1 / k[A]_0$$

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